

WHAT IS CLAIMED IS:

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1. A method of forming diamond crystals or a diamond film comprising:  
disposing a substrate in a reaction chamber; and  
subjecting a vaporized precursor comprising at least one carbon containing  
compound having a carbon to oxygen ratio greater than one to a plasma under  
conditions effective to dissociate the precursor and promote diamond growth on the  
substrate.

2. The method according to claim 1, wherein the precursor comprises a  
solution of methanol and the at least one compound having a carbon to oxygen ratio  
greater than 1.

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3. The method according to claim 2, wherein methanol is present in the  
precursor in an amount between about 0.5 wt.% to about 99.5 wt. % of the precursor.

4. The method according to claim 1, wherein the precursor is selected  
from the group comprising of ethanol, isopropanol, acetone, and combinations  
thereof.

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5. The method according to claim 1, wherein the precursor is a solution of  
methanol and a compound selected from the group comprising of ethanol,  
isopropanol, acetone, and combinations thereof.

6. The method according to claim 1, wherein the subjecting a vaporized  
precursor step is conducted at a pressure between about 1mtorr and 250 torr.

7. The method according to claim 1, wherein the substrate is heated to a  
temperature between 300° C to about 1,600° C.

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8. The method according to claim 1, wherein the carbon containing

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9. The method according to claim 1, wherein the substrate comprises a  
 a wafer of silicon, copper, aluminum, molybdenum, or alloys thereof.

10. The method according to claim 1, wherein the plasma is induced by magnetic energy.

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12. The method according to claim 1, wherein the plasma is induced by wave energy.

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providing an apparatus including an inlet, a dissociation zone, a deposition zone and an outlet;

introducing a precursor comprising methanol and at least one carbon  
 containing compound containing a carbon to oxygen ratio greater than one into the  
 under conditions effective to vaporize the precursor, flow the precursor through  
 association zone, and through the outlet;

dissociating and reacting the vaporized precursor as vaporized precursor flows  
 uses through the dissociation zone to produce OH, H, O, and carbon containing  
 s; and

transporting the radicals to the substrate in the deposition zone to produce the  
and crystals or diamond films on the surface of the substrate.

14. The process according to claim 13, wherein the dissociation and reacting steps comprise:

passing the vaporized precursor through an electrical discharge zone for dissociating the precursor in the dissociation zone.

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~~15. The process according to claim 13, wherein the introducing step comprises:~~

~~introducing the liquid precursor with methanol in an amount between about 0.5 wt.% and about 99.5%.~~

16. The process according to claim 15, further comprising:  
supplementing methanol with one or more carbon containing compounds containing carbon, hydrogen, and oxygen with the atomic ratio of carbon to oxygen greater than one.

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~~17. The process according to claim 16, further comprising:  
selecting the supplementing compounds from the group comprising of ethanol, isopropanol, acetone, and combinations thereof.~~

18. The process according to claim 13, wherein the deposition zone is maintained at a temperature between about 200° C to 1600° C and at a pressure between 1 mtorr and 250 torr.

*add C67 add K57*